Amendments to the Claims

The following listing of claims replaces all prior versions and listings of claims in the present application:

1. (Currently Amended) A pump apparatus comprising:

a rotary driving source driven and rotated by an electric signal;

a body provided with a seat section and fluid passages for communicating with a first port for sucking a fluid and a second port for discharging said fluid;

a bonnet connected to said body and having a pump chamber defined therein;

~~a seat section disposed vertically lower than said first port and said second port at a lower portion of said pump chamber;~~

a piston provided in said pump chamber displaceably in an axial direction of said body under a rotary driving action of said driving source, said piston having a tapered surface on an outer circumference with diameters gradually reduced toward said fluid passages; and

a valve plug membrane connected to said piston and provided with a shaft section which is screw-fitted into said piston, a thick-walled main valve body section formed ~~under~~ adjacent to said shaft section, and a flexible thin skirt section extending radially outwardly from ~~an upper~~ a surface of said main valve body section and from said piston, wherein said valve plug membrane has a circumferential edge which is interposed between said body and said bonnet, and said valve plug membrane is displaceable in said axial direction while being retained in a state in which said valve plug membrane is bent convexly in one of displacement directions of said piston, and

wherein said main valve body section of said valve plug membrane abuts against said seat section when said piston is displaced ~~toward said lower portion of said pump chamber~~ by operation of said rotary driving source~~, thereby shutting off communication between said first port and said second port~~.

2. (Original) The pump apparatus according to claim 1, wherein said skirt section is disposed on said tapered surface of said piston, and said skirt section rises along said tapered surface, when said piston is displaced in said axial direction.

3. (Original) The pump apparatus according to claim 1, wherein said skirt section is disposed on an inner wall surface of said bonnet, and said skirt section rises along said inner wall surface, when said piston is displaced in said axial direction.

4. (Original) The pump apparatus according to claim 1, wherein said piston has a substantially circular arc-shaped chamfered section which is formed at a position facing a seat section of said body for seating said valve plug membrane thereon.

5. (Previously Presented) The pump apparatus according to claim 1, further comprising:

a detecting section provided in said body for sensing a pressure of said fluid flowing through said fluid passages of said body.

6. (Original) The pump apparatus according to claim 1, wherein said body is provided therein with a first check valve provided on said first port and pressed in a direction toward said first port by a resilient force of a first spring, and a second check valve provided on said second port and pressed in a direction toward said pump chamber by a resilient force of a second spring.

7. (Original) The pump apparatus according to claim 6, wherein said first check valve is opened and said fluid is supplied into said pump chamber from said first port when said piston is displaced in a direction to separate from said seat section of said body, while said second check valve is opened and said fluid contained in said pump chamber flows from said second port to outside when said piston is displaced in a direction to approach said seat section.

8. (Previously Presented) The pump apparatus according to claim 1, wherein a rotary shaft, which is rotatable relative to said piston, is screwed with said piston in said axial direction,

and an end of said rotary shaft is connected to a drive shaft of said driving source through a connecting member.

9. (Previously Presented) The pump apparatus according to claim 8, wherein the displacement of said shaft in said axial direction is restricted, and said rotary shaft is retained axially in said body and is rotatable through a bearing.

10. (Original) The pump apparatus according to claim 1, wherein an engaging groove recessed linearly in said axial direction is formed on an inner portion of said bonnet, and a rotation-preventive pin attached to said piston is engaged with said engaging groove.

11. (Original) The pump apparatus according to claim 10, wherein said engaging pin is displaced along said engaging groove when said piston is displaced in said axial direction in said bonnet.

12. (Original) The pump apparatus according to claim 1, wherein grooves, each of which is recessed by a predetermined depth, are formed on said tapered surface of said piston.

13. (Original) The pump apparatus according to claim 12, wherein said grooves are provided in a circumscribing manner along said tapered surface of said piston.